vacon
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USER'S MANUAL

NX FREQUENCY CONVERTERS

SLIDING DOOR APPLICATION

ALFIF127

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1. APPLICATION DESCRIPTION

This special application is based on NXL Multi-Control application. PID and some other small features are removed. This NXL-application is designed to control the motor, which drives the lift door. Frequency converter also gives some status information to the lift controller via relay/digital output. (e.g. torque limit supervision.)

2. NEW PARAMETERS

L2.9 LIFT DOOR

P2.9.1 Door application (No/Yes)

G2.9.2 Door opening parameters

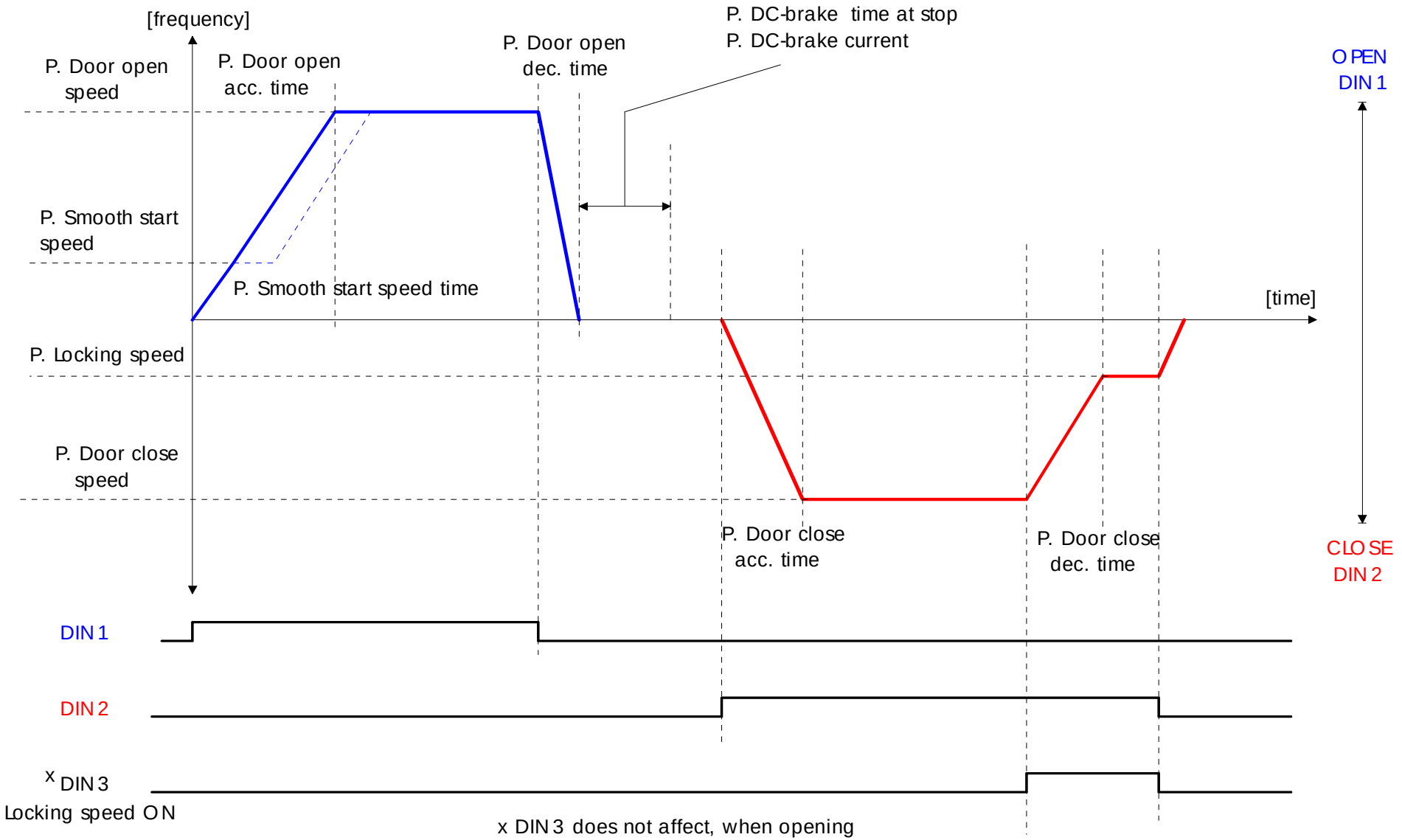
P2.9.2.1 Door open acceleration time (0.1 – 3000.0 s)
P2.9.2.2 Door open speed (0.00 – P2.1.2)
P2.9.2.3 Door open deceleration time (0.1 – 3000.0s)
P2.9.2.4 Smooth start time (Default=0) (0.0 – door open acc. time)
P2.9.2.5 Smooth start speed (Default=0) (0.00 – door open speed)
P2.9.2.6 Door opening torque limit (0.0 – 150.0 % of motor nominal torque)
P2.9.2.7 Torque superv. delay time (0.0 – 100.0 s)

G2.9.3 Door closing parameters

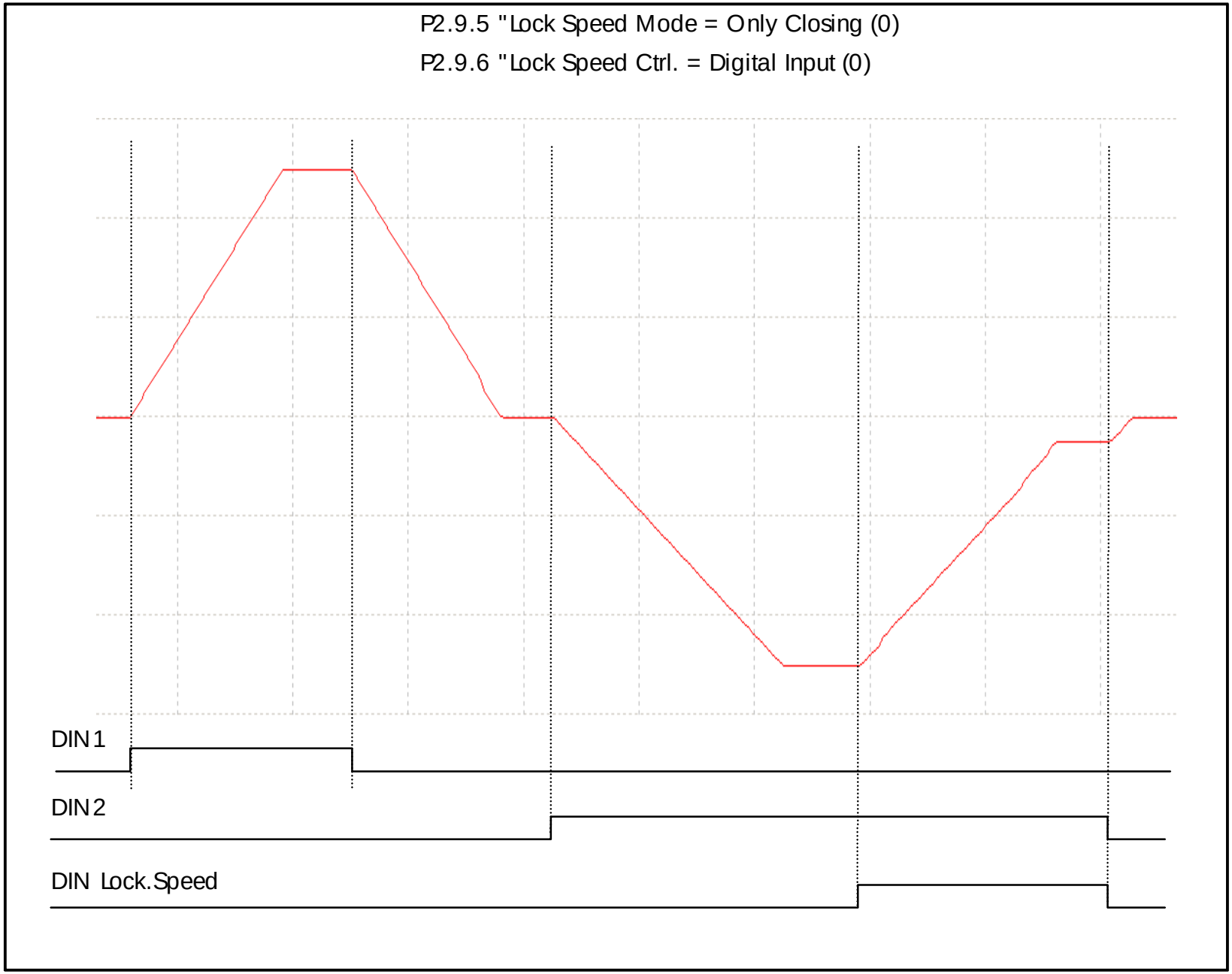
P2.9.3.1 Door close acceleration time (0.1 – 3000.0 s)
P2.9.3.2 Door close speed (0.00 – P2.1.2)
P2.9.3.3 Door close deceleration time (0.1 – 3000.0 s)
P2.9.3.4 Door closing torque limit (0.0 – 150.0 % of motor nominal torque)
P2.9.3.5 Torque superv. delay time (0.0 – 100.0 s)

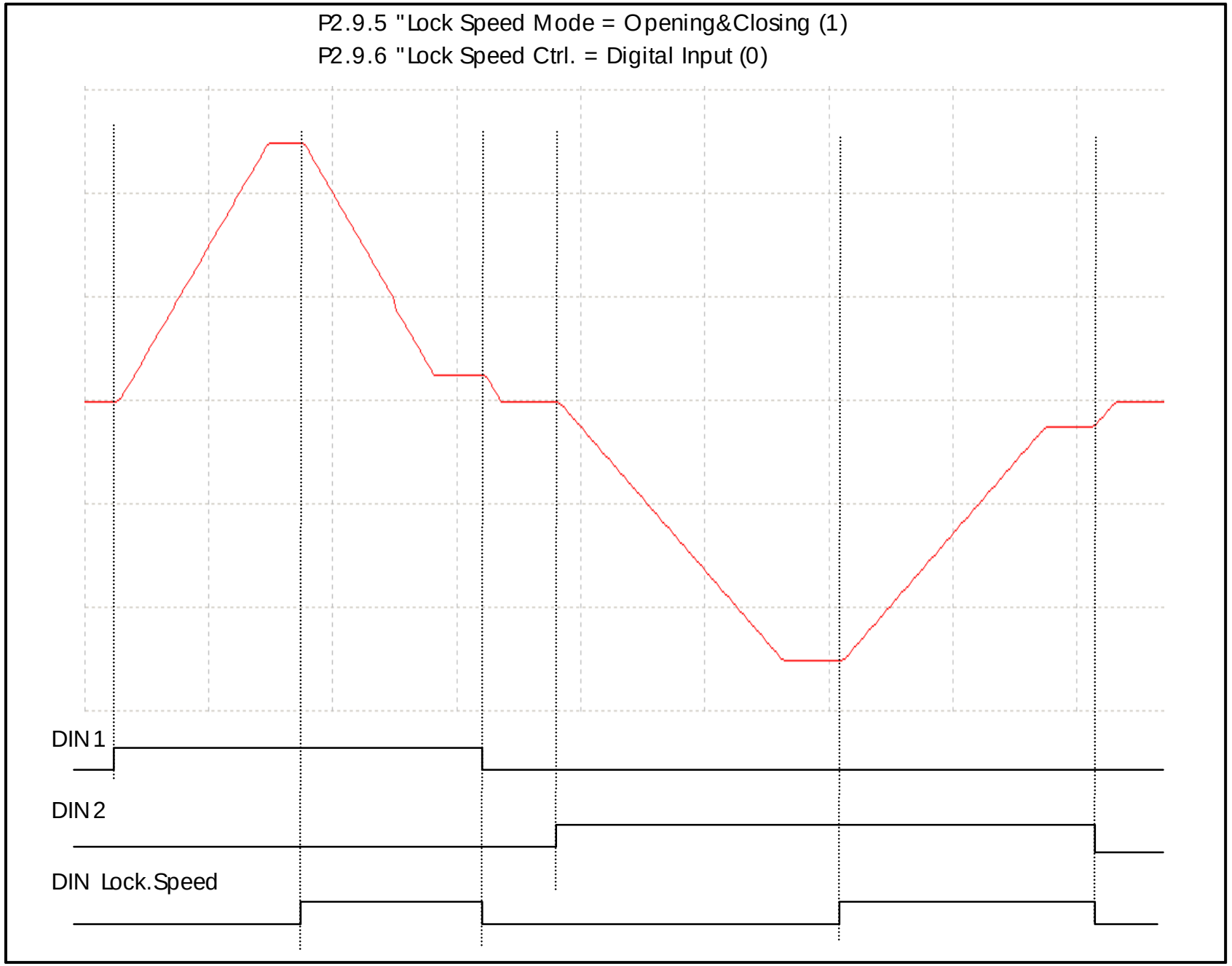
P2.9.4 Emergency deceleration time (0.1 – 3000.0 s)
P2.9.5 Locking speed mode (0=Only closing, 1=Opening&Closing)
P2.9.6 Locking speed control signal (0=Digital Input, 1=Time Delay)
P2.9.7 Locking speed (0.00 – door close speed)
P2.9.8 Locking speed on-delay time (0.00 – 300.00s)

Normal sequency



x DIN 3 does not affect, when opening


P2.9.5 "Lock Speed Mode = Only Closing (0)
P2.9.6 "Lock Speed Ctrl. = Digital Input (0)
DIN 1
DIN 2
DIN Lock.Speed



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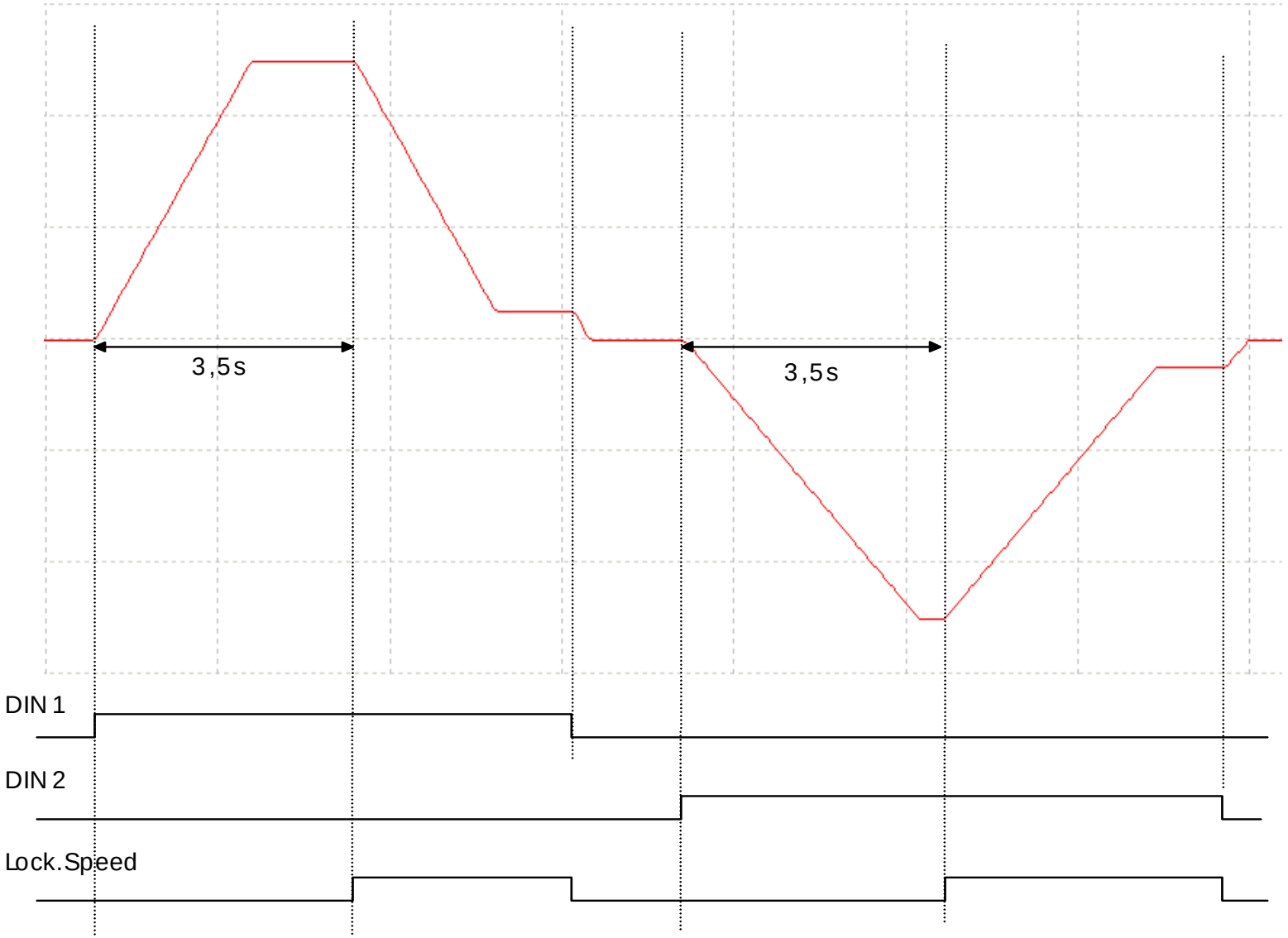
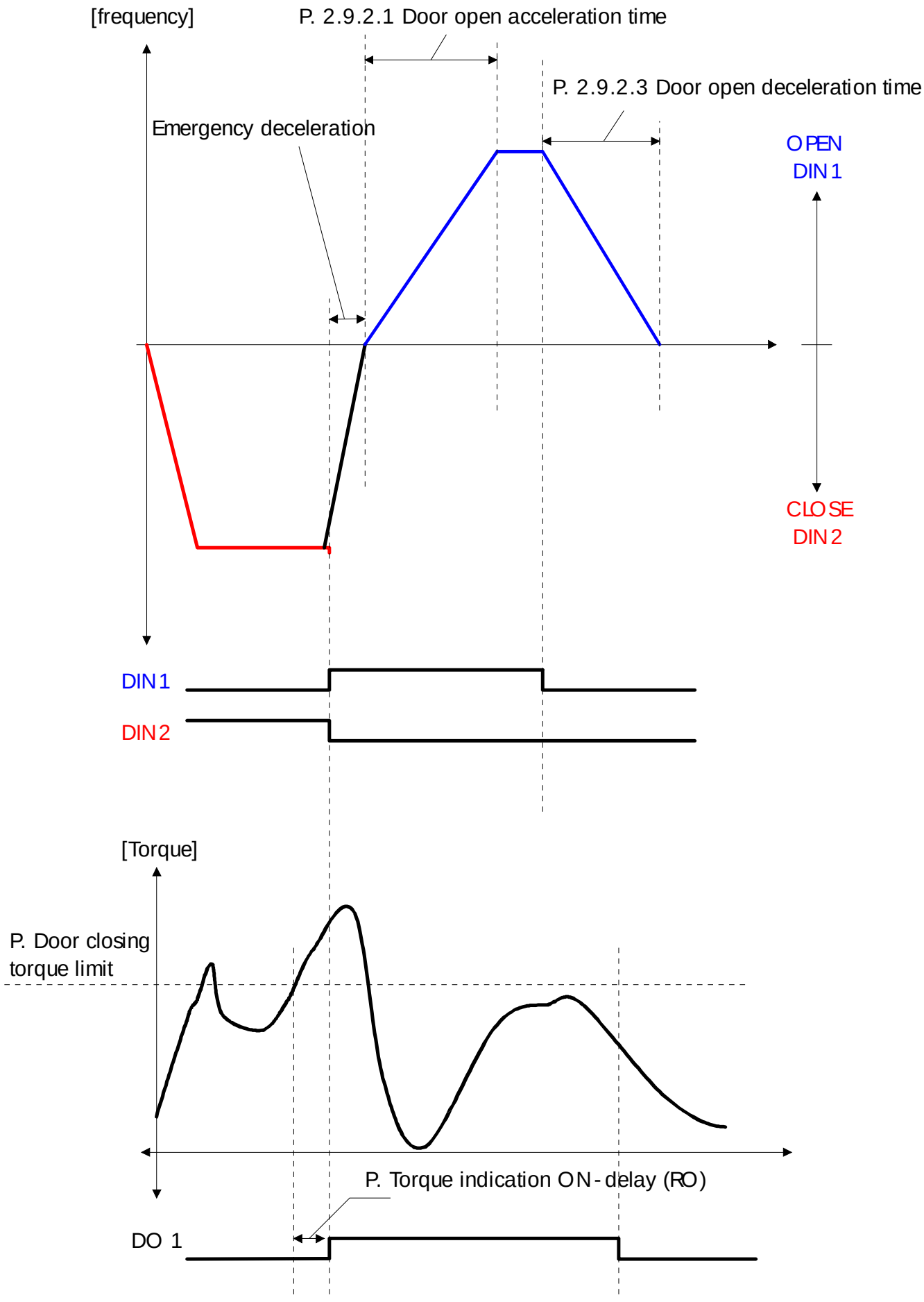
P2.9.5 "Lock Speed Mode = Opening&Closing (1)

P2.9.6 "Lock Speed Ctrl. = Time Delay (1)

P2.9.8 "Lock Sp. On-Del, = 3,5s




[frequency]
P. 2.9.2.1 Door open acceleration time
P. 2.9.2.3 Door open deceleration time
Emergency deceleration
OPEN
DIN 1
CLOSE
DIN 2
DIN 1
DIN 2
[Torque]
P. Door closing
torque limit
P. Torque indication ON - delay (RO)
DO 1

3. PARAMETER LIST

On the next pages you will find the lists of parameters within the respective parameter groups.

Column explanations:

Code = Location indication on the keypad; Shows the operator the present param. number
Parameter = Name of parameter
Min = Minimum value of parameter
Max = Maximum value of parameter
Unit = Unit of parameter value; Given if available
Default = Value preset by factory
Cust = Customer's own setting
ID = ID number of the parameter (used with PC tools)
= On the parameter code: parameter value can only be changed after the FC has been stopped.

3.1 Monitoring values (Control keypad: menu M1)

The monitoring values are the actual values of parameters and signals as well as statuses and measurements. Monitoring values cannot be edited.
See Vacon NXL User's Manual, Chapter 7.3.1 for more information.

Code	Parameter	Unit	ID	Description
V1.1	Output frequency	Hz	1	Frequency to the motor
V1.2	Frequency reference	Hz	25	
V1.3	Motor speed	rpm	2	Calculated motor speed
V1.4	Motor current	A	3	Measured motor current
V1.5	Motor torque	%	4	Calculated actual torque/nominal torque of the unit
V1.6	Motor power	%	5	Calculated actual power/nominal power of the unit
V1.7	Motor voltage	V	6	Calculated motor voltage
V1.8	DC-link voltage	V	7	Measured DC-link voltage
V1.9	Unit temperature	°C	8	Heat sink temperature
V1.10	Analogue input 1	V	13	AI1
V1.11	Analogue input 2	mA	14	AI2
V1.12	Analogue output current	mA	26	AO1
V1.13	Analogue output current 1, expander board	mA	31	
V1.14	Analogue output current 2, expander board	mA	32	
V1.15	DIN1, DIN2, DIN3		15	Digital input statuses
V1.16	DIE1, DIE2, DIE3		33	I/O expander board: Digital input statuses
V1.17	RO1		34	Relay output 1 status
V1.18	ROE1, ROE2, ROE3		35	I/O exp. board: Relay output statuses
V1.19	DOE 1		36	I/O exp. board: Digital output 1 status

Table 3-1. Monitoring values

3.2 Basic parameters (Control keypad: Menu P2 → B2.1)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.1.1	Min frequency	0,00	Par. 2.1.2	Hz	0,00		101	
P2.1.2	Max frequency	Par. 2.1.1	320,00	Hz	50,00		102	**NOTE**: If f_{max} > than the motor synchronous speed, check suitability for motor and drive system
P2.1.3	Acceleration time 1	0,1	3000,0	s	1,0		103	
P2.1.4	Deceleration time 1	0,1	3000,0	s	1,0		104	
P2.1.5	Current limit	0,1 x I_L	2,5 x I_L	A	1,5 x I_L		107	**NOTE**: Formulas apply approximately for frequency converters up to MF3. For greater sizes, consult the factory.
P2.1.6	Nominal voltage of the motor	180	690	V	NXL2:230v NXL5:400v		110	
P2.1.7	Nominal frequency of the motor	30,00	320,00	Hz	50,00		111	Check the rating plate of the motor
P2.1.8	Nominal speed of the motor	300	20 000	rpm	1440		112	The default applies for a 4-pole motor and a nominal size frequency converter.
P2.1.9	Nominal current of the motor	1 x I_L	2,5 x I_L	A	I_L		113	Check the rating plate of the motor
P2.1.10	Motor cosφ	0,30	1,00		0,85		120	Check the rating plate of the motor
P2.1.11	Start function	0	1		0		505	**0**=Ramp **1**=Flying start
P2.1.12	Stop function	0	1		0		506	**0**=Coasting **1**=Ramp
P2.1.13	U/f optimisation	0	1		0		109	**0**=Not used **1**=Automatic torque boost
P2.1.14	I/O reference	0	4		0		117	**0**=AI1 **1**=AI2 **2**=Keypad reference **3**=Fieldbus reference (FBSpeedReference) **4**=Motor potentiometer
P2.1.15	AI2 signal range	1	4		2		390	Not used if AI2 Custom min <> 0% or AI2 custom max. <> 100% **1**=0—20 mA **2**=4—20 mA **3**=0V – 10V **4**=2V – 10V
P2.1.16	Iout content	0	8		1		307	**0**=Not used **1**=Output freq. (0—f_{max}) **2**=Freq. reference (0—f_{max}) **3**=Motor speed (0—Motor nominal speed) **4**=Output current (0—I_{nMotor}) **5**=Motor torque (0—T_{nMotor}) **6**=Motor power (0—P_{nMotor}) **7**=Motor voltage (0—U_{nMotor}) **8**=DC-link volt (0—U_{nMotor})

P2.1.17	DIN2 function	0	8		1		319	**0**=Not used **1**=Start Reverse (DIN1=Start forward) **2**=Reverse (DIN1=Start) **3**=Stop pulse (DIN1=Start pulse) **4**=External fault, cc **5**=External fault, oc **6**=Run enable **7**=Preset speed 2 **8**= Motor pot. UP (cc)
P2.1.18	DIN3 function	0	11		11		301	**0**=Not used **1**=Reverse **2**=External fault, cc **3**=External fault, oc **4**=Fault reset **5**=Run enable **6**=Preset speed 1 **7**=Preset speed 2 **8**=DC-braking command **9**=Motor pot. UP (cc) **10**=Motor pot. DOWN (cc) **11**=Locking speed
P2.1.19	Preset speed 1	0,00	Par. 2.1.2	Hz	10,00		105	
P2.1.20	Preset speed 2	0,00	Par. 2.1.2	Hz	50,00		106	
P2.1.21	Automatic restart	0	1		0		731	**0**=Not used **1**=Used
P2.1.22	Parameter conceal	0	1		1		115	**0**=All parameters and menus visible **1**=Only groups B2.1, M2.6 and L2.9

Table 3-2. Basic Parameters

3.3 Input signals (Control keypad: Menu P2 → I2.2)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.2.1	Expander board DIE1 function	0	11		7		368	**0**=Not used **1**=Reverse **2**=External fault, cc **3**=External fault, oc **4**=Fault reset **5**=Run enable **6**=Preset speed 1 **7**=Preset speed 2 **8**=DC-braking command **9**=Motor pot. UP (cc) **10**=Motor pot. DOWN (cc) **11**=Locking speed
P2.2.2	Expander board DIE2 function	0	11		4		330	See above
P2.2.3	Expander board DIE3 function	0	11		11		369	See above
P2.2.4	DIN4 function (AI1)	0	11		2		499	Used if P2.2.6 = 0 See the selections above
P2.2.5	AI1 signal selection	0			10		377	**10**=AI1 (**1**=Local, **0**=input 1) **11**=AI2 (**1**=Local, **1**= input 2) **20**=Exp. AI1 (**2**=exp.board **0**=input 1) **21**=Exp AI2 (**2**=exp.board **1**=input 2)
P2.2.6	AI1 signal range	0	4		3		379	**0**=Digital input 4 **1**=0mA – 20mA (MF4-->) **2**=4mA – 20mA (MF4-->) **3**=0V – 10V **4**=2V – 10V Not used if AI2 Custom min > 0% or AI2 custom max. < 100% **Note!** See NXL User's manual, chapter 7.3.6: **AI1 mode**
P2.2.7	AI1 custom minimum setting	0,00	100,00	%	0,00		380	
P2.2.8	AI1 custom maximum setting	0,00	100,00	%	100,00		381	
P2.2.9	AI1 inversion	0	1		0		387	**0**=Not inverted **1**=Inverted
P2.2.10	AI1 filter time	0,00	10,00	s	0,10		378	**0**=No filtering
P2.2.11	AI2 signal selection	0			11		388	As par. 2.2.5
P2.2.12	AI2 signal range	1	4		2		390	Not used if AI2 Custom min <> 0% or AI2 custom max. <> 100% **1**=0—20 mA **2**=4—20 mA **3**=0V – 10V **4**=2V – 10V
P2.2.13	AI2 custom minimum setting	0,00	100,00	%	0,00		391	
P2.2.14	AI2 custom maximum setting	0,00	100,00	%	100,00		392	
P2.2.15	AI2 inversion	0	1		0		398	**0**=Not inverted **1**=Inverted
P2.2.16	AI2 filter time	0,00	10,00	s	0,10		389	**0**=No filtering

P2.2.17	Motor potentiometer frequency reference memory reset	0	2		1		367	**0**=No reset **1**=Reset if stopped or powered down **2**=Reset if powered down
P2.2.18	Reference scaling minimum value	0,00	P2.2.19		0,00		344	
P2.2.19	Reference scaling maximum value	P2.2.18	320,00		0,00		345	
P2.2.20	Keypad control reference selection	0	4		2		121	**0**=AI1 **1**=AI2 **2**=Keypad reference **3**=Fieldbus reference (FBSpeedreference) **4**=Motor potentiometer
P2.2.21	Fieldbus control reference selection	0	4		3		122	See above

Table 3-3. Input signals

3.4 Output signals (Control keypad: Menu P2 → O2.3)

Code	Parameter	Min	Max	Unit	Default	Cu st	ID	Note
P2.3.1	Relay output 1 function	0	19		17		313	**0**=Not used **1**=Ready **2**=Run **3**=Fault **4**=Fault inverted **5**=FC overheat warning **6**=Ext. fault or warning **7**=Ref. fault or warning **8**=Warning **9**=Reversed **10**=Preset speed **11**=At speed **12**=Mot. regulator active **13**=OP freq. limit superv.1 **14**=Control place: IO **15**=Thermistor fault/ warning **16**=Actual value supervision **17**=Door closing torque supervision **18**=DIN3 status **19**= Door opening torque supervision
P2.3.2	Exp RO1 function	0	19		18		314	As parameter 2.3.1
P2.3.3	Exp RO2 function	0	19		0		317	As parameter 2.3.1
P2.3.4	Exp RO3 function	0	19		0		1510	
P2.3.5	Exp DO1 function	0	19		0		312	As parameter 2.3.1
P2.3.6	Analogue output function	0	8		1		307	See par. 2.1.16
P2.3.7	Analogue output filter time	0,00	10,00	s	1,00		308	**0**=No filtering
P2.3.8	Analogue output inversion	0	1		0		309	**0**=Not inverted **1**=Inverted
P2.3.9	Analogue output minimum	0	1		0		310	**0**=0 mA **1**=4 mA
P2.3.10	Analogue output scale	10	1000	%	100		311	
P2.3.11	Expander board analogue output 1 function	0	8		0		472	As parameter 2.1.16
P2.3.12	Expander board analogue output 2 function	0	12		0		479	As parameter 2.1.16
P2.3.13	Output frequency limit 1 supervision	0	2		0		315	**0**=No limit **1**=Low limit supervision **2**=High limit supervision
P2.3.14	Output frequency limit 1; Supervised value	0,00	Par. 2.1.2	Hz	0,00		316	

Table 3-4. Output signals

3.5 Drive control parameters (Control keypad: Menu P2 → D2.4)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.4.1	Ramp 1 shape	0,0	10,0	s	0,0		500	**0**=Linear **>0**=S-curve ramp time
P2.4.2	Brake chopper	0	3		0		504	**0**=Disabled **1**=Used in Run state **3**=Used in Run and Stop state
P2.4.3	DC braking current	0,15 x I_n	1,5 x I_n	A	Varies		507	
P2.4.4	DC braking time at stop	0,00	600,00	s	0,00		508	**0**=DC brake is off at stop
P2.4.5	Frequency to start DC braking during ramp stop	0,10	10,00	Hz	1,50		515	
P2.4.6	DC braking time at start	0,00	600,00	s	0,00		516	**0**=DC brake is off at start
P2.4.7	Flux brake	0	1		0		520	**0**=Off **1**=On
P2.4.8	Flux braking current	0,0	Varies	A	0,0		519	

Table 3-5. Drive control parameters

3.6 Prohibit frequency parameters (Control keypad: Menu P2 → P2.5)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.5.1	Prohibit frequency range 1 low limit	0,0	Par. 2.5.2	Hz	0,0		509	**0**=Not used
P2.5.2	Prohibit frequency range 1 high limit	0,0	Par. 2.1.2	Hz	0,0		510	**0**=Not used
P2.5.3	Prohibit frequencies acc./dec. ramp scaling	0,1	10,0	Times	1,0		518	Multiplier of the currently selected ramp time between prohibit frequency limits

Table 3-6. Prohibit frequency parameters

3.7 Motor control parameters (Control keypad: Menu P2 → M2.6)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.6.1	Motor control mode	0	1		0		600	**0**=Frequency control **1**=Speed control
P2.6.2	U/f ratio selection	0	3		0		108	**0**=Linear **1**=Squared **2**=Programmable **3**=Linear with flux optim.
P2.6.3	Field weakening point	30,00	320,00	Hz	50,00		602	
P2.6.4	Voltage at field weakening point	10,00	200,00	%	100,00		603	n% x U_{nmot}
P2.6.5	U/f curve midpoint frequency	0,00	par. P2.6.3	Hz	50,00		604	
P2.6.6	U/f curve midpoint voltage	0,00	100,00	%	100,00		605	n% x U_{nmot} Parameter max. value = par. 2.6.4
P2.6.7	Output voltage at zero frequency	0,00	40,00	%	0,00		606	n% x U_{nmot}
P2.6.8	Switching frequency	1,0	16,0	kHz	6,0		601	Depends on kW
P2.6.9	Overvoltage controller	0	1		1		607	**0**=Not used **1**=Used
P2.6.10	Undervoltage controller	0	1		1		608	**0**=Not used **1**=Used
P2.6.11	Stator voltage drop	0	1000		256		1516	Measured voltage drop at stator resistance between two phases with nom. Current of motor. Unit: 256=10 %

Table 3-7. Motor control parameters

3.8 Protections (Control keypad: Menu P2 → P2.7)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.7.1	Response to 4mA reference fault	0	3		0		700	**0**=No response **1**=Warning **2**=Fault,stop acc. to 2.1.12 **3**=Fault,stop by coasting
P2.7.2	Response to external fault	0	3		2		701	**0**=No response **1**=Warning **2**=Fault,stop acc. to 2.1.12 **3**=Fault,stop by coasting
P2.7.3	Response to undervoltage fault	1	3		2		727	
P2.7.4	Output phase supervision	0	3		2		702	
P2.7.5	Earth fault protection	0	3		2		703	
P2.7.6	Thermal protection of the motor	0	3		2		704	
P2.7.7	Motor ambient temperature factor	–100,0	100,0	%	0,0		705	
P2.7.8	Motor cooling factor at zero speed	0,0	150,0	%	40,0		706	
P2.7.9	Motor thermal time constant	1	200	min	45		707	
P2.7.10	Motor duty cycle	0	100	%	100		708	
P2.7.11	Stall protection	0	3		1		709	As par. 2.7.1
P2.7.12	Stall current limit	0,1	I_{nmotor} x 2	A	I_{nmotor} x1.3		710	
P2.7.13	Stall time limit	1,00	120,00	s	15,00		711	
P2.7.14	Stall frequency limit	1,0	P 2.1.2	Hz	25,0		712	
P2.7.15	Underload protection	0	3		0		713	As par. 2.7.1
P2.7.16	Underload curve at nominal frequency	10,0	150,0	%	50,0		714	
P2.7.17	Underload curve at zero frequency	5,0	150,0	%	10,0		715	
P2.7.18	Underload protection time limit	2,00	600,00	s	20,00		716	
P2.7.19	Response to thermistor fault	0	3		0		732	As par. 2.7.1
P2.7.20	Response to fieldbus fault	0	3		2		733	As par. 2.7.1
P2.7.21	Response to slot fault	0	3		2		734	As par. 2.7.1
P2.7.22	Actual value supervision	0	4		0		735	**0**=No response **1**=Warning if below limit **2**=Warning if above limit **3**=Fault, if below limit **4**=Fault, if above limit
P2.7.23	Actual value supervision limit	0,0	100,0	%	10,0		736	
P2.7.24	Actual value supervision delay	0	3600	s	5		737	

Table 3-8. Protections

3.9 Autorestart parameters (Control keypad: Menu P2 → A2.8)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.8.1	Wait time	0,10	10,00	s	0,50		717	
P2.8.2	Trial time	0,00	60,00	s	30,00		718	
P2.8.3	Start function	0	2		0		719	**0**=Ramp **1**=Flying start **2**=According to par. 2.4.6

Table 3-9. Autorestart parameters

3.10 Lift door parameters (Control keypad: Menu P2 → L2.9)

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.9.1	Door application	0	1		1	1500	Activates the door application
Group G2.9.2							
Group G2.9.3							
P2.9.4	Emergency ramp	0,2	3000,0	s	1,0	1509	Emergency deceleration, when locking speed is not active.
P2.9.5	Lock Speed Mode	0	1		0	1519	0=Locking speed used only when closing. 1=Locking speed used both in opening and closing.
P2.9.6	Lock Speed Ctrl	0	1		0	1517	Signal selection for the locking speed control. 0=Digital input 1=Time Delayed (P2.9.8)
P2.9.7	Locking Speed	0	P2.9.3.2	Hz	5,00	1507	Locking speed.
P2.9.8	Lock. Sp. On-Del	0,00	300,00	s	5,00	1518	Locking speed on delay, when parameter P2.9.6 is "1".

Table 3-10. Lift door parameters

3.11 Lift door open parameters (Control keypad: Menu P2 → G2.9.2)

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.9.2.1	Open acc. time	0,1	3000,0	s	1,0	1501	Door open acceleration time
P2.9.2.2	Open speed	0,00	P2.1.2	Hz	50,00	1502	Door open constant frequency
P2.9.2.3	Open dec. time	0,1	3000,0	s	1,0	1503	Door open deceleration time
P2.9.2.4	Smooth Start Time	0,0	P2.9.2.1	s	0,0	1514	Time for the smooth start frequency
P2.9.2.5	Smooth Start Freq	0,00	P2.9.2.2	Hz	0,00	1515	Smooth start frequency
P2.9.2.6	Torq Lim Open	0,0	150,0	%	50,0	1511	Torque limit, when opening
P2.9.2.7	Delay Opening Torq	0,0	100,0	s	1,0	1513	Time delay for the opening torque supervision (=Filtering)

Table 3-11. Lift door open parameters

3.12 Lift door close parameters (Control keypad: Menu P2 → G2.9.3)

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.9.3.1	Close acc. time	0,1	3000,0	s	1,0	1504	Door close acceleration time
P2.9.3.2	Close speed	0,00	P2.1.2	Hz	50,00	1505	Door close constant frequency
P2.9.3.3	Close dec. time	0,1	3000,0	s	1,0	1506	Door close deceleration time
P2.9.3.4	Torq Lim Close	0,0	150,0	%	50,0	1508	Torque limit, when closing
P2.9.3.5	Delay closing Torq	0,0	100,0	s	1,0	1512	Time delay for the closing torque supervision (=Filtering)

Table 3-12. Lift door close parameters

3.13 Keypad control (Control keypad: Menu K3)

The parameters for the selection of control place and direction on the keypad are listed below.

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P3.1	Control place	1	3		1		125	1 = I/O terminal 2 = Keypad 3 = Fieldbus
R3.2	Keypad reference	Par. 2.1.1	Par. 2.1.2	Hz				
P3.3	Direction (on keypad)	0	1		0		123	0 = Forward 1 = Reverse
P3.4	Stop button	0	1		1		114	0=Limited function of Stop button 1=Stop button always enabled

Table 3-13. Keypad control

3.14 System menu (Control keypad: Menu S6)

For parameters and functions related to the general use of the frequency converter, such as customised parameter sets or information about the hardware and software, see Chapter 7.3.6 in the Vacon NXL User's Manual.

3.15 Expander boards (Control keypad: Menu E7)

The E7 menu shows the expander boards attached to the control board and board-related information. For more information, see Chapter 7.3.7 in the Vacon NXL User's Manual.

Vaasa
Vacon Plc (Head office and production)
Runsorintie 7
65380 Vaasa
firstname.lastname@vacon.com
telephone: +358 (0)201 2121
fax: +358 (0)201 212 205

Helsinki
Vacon Plc
Äyritie 12
01510 Vantaa
telephone: +358 (0)201 212 600
fax: +358 (0)201 212 699

Tampere
Vacon Plc
Vehnämyllynkatu 18
33700 Tampere
telephone: +358 (0)201 2121
fax: +358 (0)201 212 750

Vacon Traction Oy
Vehnämyllynkatu 18
33700 Tampere
telephone: +358 (0)201 2121
fax: +358 (0)201 212 710

SALES COMPANIES AND REPRESENTATIVE OFFICES:

Austria
Vacon AT Antriebssysteme GmbH
Aumühlweg 21
2544 Leobersdorf
telephone: +43 2256 651 66
fax: +43 2256 651 66 66

Belgium
Vacon Benelux NV/SA
Interleuvenlaan 62
3001 Heverlee (Leuven)
telephone: +32 (0)16 394 825
fax: +32 (0)16 394 827

France
Vacon France s.a.s.
1 Rue Jacquard – BP72
91280 Saint Pierre du Perray CDIS
telephone: +33 (0)1 69 89 60 30
fax: +33 (0)1 69 89 60 40

Germany
Vacon GmbH
Gladbecker Strasse 425
45329 Essen
telephone: +49 (0)201 806 700
fax: +49 (0)201 806 7099

Great Britain
Vacon Drives (UK) Ltd.
18, Maizefield
Hinckley Fields Industrial Estate
Hinckley
LE10 1YF Leicestershire
telephone: +44 (0)1455 611 515
fax: +44 (0)1455 611 517

Italy
Vacon S.p.A.
Via F.lli Guerra, 35
42100 Reggio Emilia
telephone: +39 0522 276811
fax: +39 0522 276890

The Netherlands
Vacon Benelux BV
Weide 40
4206 CJ Gorinchem
telephone: +31 (0)183 642 970
fax: +31 (0)183 642 971

Norway
Vacon AS
Langgata 2
3080 Holmestrand
telephone: +47 330 96120
fax: +47 330 96130

PR China
Vacon Suzhou Drives Co. Ltd.
Blk 11A
428 Xinglong Street
Suchun Industrial Square
Suzhou 215126
telephone: +86 512 6283 6630
fax: +86 512 6283 6618

Vacon Suzhou Drives Co. Ltd.
Beijing Office
A205, Grand Pacific Garden Mansion
8A Guanhua Road
Beijing 100026
telephone: +86 10 6581 3734
fax: +86 10 6581 3754

Russia
ZAO Vacon Drives
Bolshaja Jakimanka 31,
stroenie 18
109180 Moscow
telephone: +7 (095) 974 14 47
fax: +7 (095) 974 15 54

ZAO Vacon Drives
2ya Sovetskaya 7, office 210A
191036 St. Petersburg
telephone: +7 (812) 332 1114
fax: +7 (812) 279 9053

Singapore
Vacon Plc
Singapore Representative Office
102F Pasir Panjang Road
#02-06 Citilink Warehouse Complex
Singapore 118530
telephone: +65 6278 8533
fax: +65 6278 1066

Spain
Vacon Drives Ibérica S.A.
Miquel Servet, 2. P.I. Bufalvent
08243 Manresa
telephone: +34 93 877 45 06
fax: +34 93 877 00 09

Sweden
Vacon AB
Torget 1
172 67 Sundbyberg
telephone: +46 (0)8 293 055
fax: +46 (0)8 290 755

Vacon distributor: